EXTENSION FOLDER 386 Agricultural Extension Service University of Minnesota

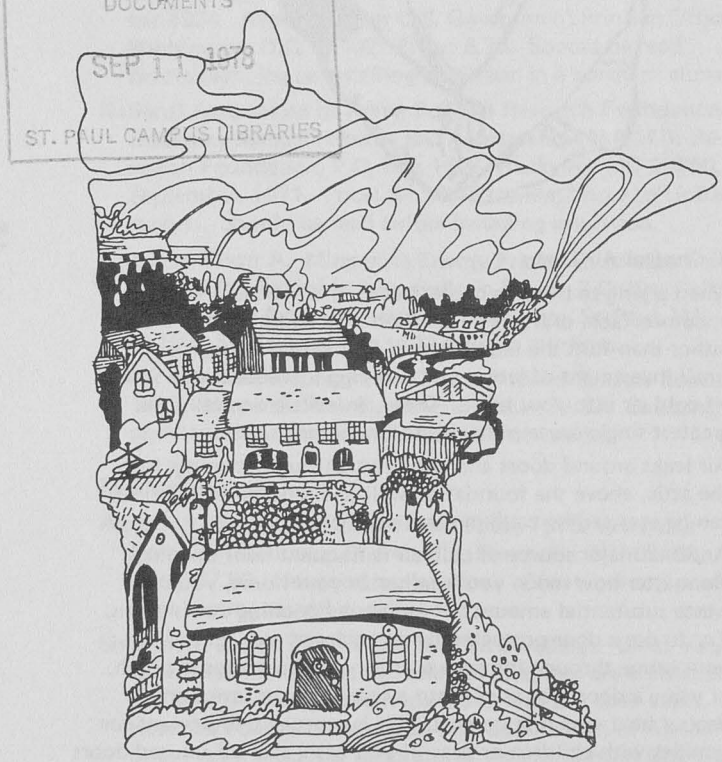
FIRST THINGS FIRST

What To Do Before Investing in Home Insulation

Residential Energy Information. Offered to Minnesota residents through the University of Minnesota Agricultural Extension Service, Home Economics—Family Living Program. The publication was developed by the Wisconsin Energy Extension Service in cooperation with other public agencies in Wisconsin, and has been modified only for reference to the state of Minnesota.

LITTLE THINGS MEAN A LOT

There is no question that a well weatherized home is a well insulated home. But insulation is not the only thing you can do to save energy dollars. It is not even necessarily the first thing you should do. There are several measures which cost less money, but provide significant fuel savings. They are tested, no-risk common-sense measures which should be part of any serious household energy conservation program. In energy conservation, even little things mean a lot.



The energy crisis has created an enormous interest in fuel conservation. Many homeowners are now exploring ways to weatherize their houses, making them more comfortable and less expensive to heat and cool. This mushrooming interest has caused problems. New, untested products are being placed on the market to take advantage of high consumer demand for conservation. In a few cases, unscrupulous people have gone into the home weatherization business. Demand for home insulation is so high that there is a nationwide shortage of good insulating materials. And many homeowners, believing that insulation is the *first* thing they should do, have sunk major investments into insulation materials of questionable safety and efficiency. Such problems have occurred especially among homeowners who have insulated outside walls.

Despite the problems, home weatherization remains an important and advantageous thing to do. Done carefully and wisely, it's one of the best investments a homeowner can make. The money saved each month on heating and cooling bills is like an extra paycheck, with one notable exception: you don't have to pay taxes on the money you "earn" by lowering your home's energy consumption. In addition, a weatherized home is a more valuable and more saleable home. Buyers are more concerned than ever about energy efficiency, and many homeowners find that the money they've invested in weatherization is returned in higher sale prices when they market their homes.

FIRST THINGS FIRST

This pamphlet outlines five steps you can take to weatherize your home. The steps are arranged for the typical Minnesota home in order of greatest savings for lowest cost. The steps are:

- **Controlling Indoor Temperatures**
- **Controlling Air Leaks**
- **Maintaining Heating Systems**
- **Reducing Heat Loss through Windows**
- **Adding Insulation**

To carry out your home weatherization program, start with step number one and work your way down the list as far as your budget will allow.

1. Control Indoor Temperatures

Thermostat adjustment is one of the ways you can operate your household so that it wastes as little fuel as possible. Much energy can be saved by heating or cooling only those portions of the home in which heating and cooling are really necessary. Turn off heat or air-conditioning in unused rooms. In those rooms which are in use, make sure that curtains, furniture and other objects do not block radiators or registers. Then, adjust your thermostat so that you are heating or cooling only as much as is really necessary.

For each degree you reduce your indoor temperatures during the heating season, you will save about 3 per cent on fuel. For example, turning down your thermostat from 72 degrees to 68 degrees will save about 12 percent of your home's heating energy. Turn your thermostats down even further at night and when you are away from home. Contrary to popular opinion, warming your house back up *does not* use more fuel than you have saved. During the summer, set your air conditioner at a comfortable 78 degrees.

When cutting off heat or reducing indoor temperatures, be careful not to freeze water pipes. If necessary, use heat tapes and insulation to protect exposed pipes. For pipes within outside walls, keep indoor temperatures high enough to prevent freezing.

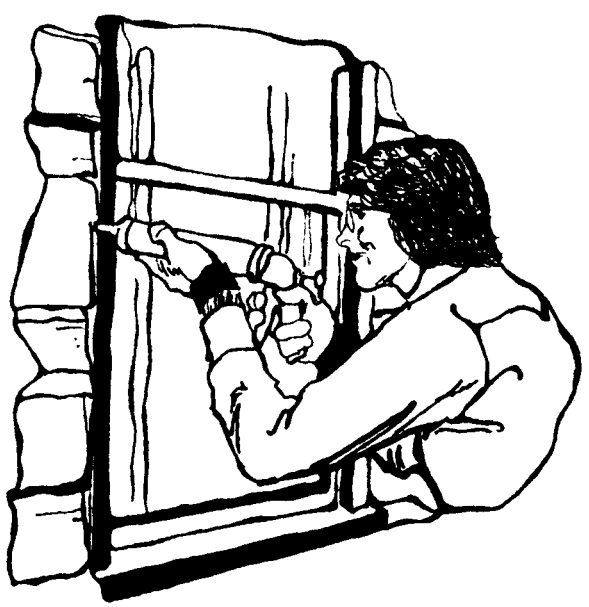
Thermostat adjustments cost nothing, but they can save a significant amount of fuel. If you wish, you can invest in a clock thermostat which will adjust indoor temperatures automatically.

2. Control Air Leaks

When trying to live in a cooler house, many people notice uncomfortable drafts. The solution is to eliminate the drafts, rather than turn the heat back up. For very little cost and a small investment of labor, you can plug up most cracks which let cold air into your home. These air leaks are usually the greatest single cause of heat loss in a home.

Air leaks around doors and windows, through openings into the attic, above the foundation wall and around the chimney can be stopped by caulking and weatherstripping.

Another major source of cold air is frequent door openings. No matter how much you weatherize your home, you can waste substantial amounts of money by opening doors often. Try to use a door protected by an enclosed area. Entering your home through the garage or through an enclosed porch, or using a door that opens into a vestibule can save a great deal of heat—again at no cost. This is especially important for families with children or pets. If you wish, seal off unused doors for the winter, but make sure they can be opened easily in case of emergency.



3. Maintain Heating Systems

Your furnace will work harder and use more fuel if it is not properly maintained. Heating systems should be given routine maintenance every year to keep them running efficiently. Ask your service representative to show you how to change air filters and install new filters frequently.

Also ask your service representative to help you check your entire system carefully for things that need additional work. Seal leaks in ductwork and insulate all ducts exposed to the cold in attics, crawl spaces or garages. Up to six inches of insulation is needed for hot air ducts exposed to outside temperatures. If you have hot water or steam heat, make sure all pipes are well insulated. The heat escaping from ducts or pipes often helps heat basements and crawl spaces. Make sure insulating the ducts will not cause plumbing to freeze.

If you have a very old heating system, it may pay to replace it. This will require careful consideration, since it will mean a major investment. Talk to your building inspector, local heating contractor or your local utility before choosing a new system. Make sure the system you choose is safe and suitable for your needs.

Be extra cautious if you plan to modify your existing heating system with devices now on the market to help save energy. Consult your utility or a reputable local heating contractor to make sure such devices are safe.

4. Reducing Heat Loss Through Windows

Windows are, to a degree, uninsulated holes in your house. By adding storm windows, you can reduce by half the heat lost through single-pane windows. Adding a third layer of glass or plastic will reduce heat loss by an additional one-third. Most hardware stores or lumber yards now offer materials which will allow you to add additional layers of glass or plastic. The type of product you use will determine whether you should add the new layer on the outside or inside of your window. Added layers which cover the cracks around movable parts of your windows will help stop air leakage.

Even with three layers of glass or plastic, however, the heat loss through windows is at least 10 times that through a well insulated ceiling. You might consider movable insulation, such as heavy, tight-fitting drapes or insulated shutters. Make sure that whatever you do does not cause a fire hazard, and that windows can still be opened quickly if they may be needed for emergency escape.

5. Add Insulation (carefully)

If there is one piece of general advice governing home insulation, it is: **Be Cautious.** Insulation is the most complicated and can be the most expensive of the five steps. It is also the measure most apt to involve the hiring of contractors. Unless you choose proven materials and unless those materials are installed properly, insulation can cause serious problems.

The effectiveness of different types and thicknesses of insulation is indicated by "R-value." R-value is a measure of how well a material resists transmitting heat—in other words, how well it will keep heat from passing through the walls, ceilings and floors of your home. The higher the R-value, the more effective the insulation. When purchasing insulation, pay attention to its R-value. Two materials of the same thickness can be substantially different in how well they insulate.

In regard to your budget, insulation should be approached in the same way as home weatherization in general: by accomplishing first those steps which are easiest and least expensive.

Insulate your home in the following order:

(a) Attics or Ceilings:

These often can be insulated by the homeowner. Determine the type of insulation in your attic now and measure its thickness. Using the table below, find whether the R-value of your present insulation is less than 10. If it is, it will pay to add enough new insulation to increase the R-value to 38. If you are a do-it-yourselfer, remember that adding insulation is not simple. Vapor barriers, attic ventilation and the safety and efficiency of different materials all are critical considerations. Improper installation can cause structural damage to your house and ruin the insulation, wasting your investment. Before purchasing or installing your own insulation, order and read appropriate booklets recommended at the end of this brochure. Spending even $5 or $10 on books is wise if it helps you do a $200 or $300 job correctly.

INSULATION VALUES

Material:	R per inch: *(average)*	Approximate Inches for . . . R19	R38
Batt/Blanket			
Mineral Fiber (rock, slag or glass)	3.3	6	11½
Cellulose	3.5	5½	11
Loose Fill			
Mineral Fiber (rock, slag or glass)	3.0	6½	13
Cellulose	3.6	5½	11
Vermiculite	2.1	9	18
Perlite	2.7	7	14
Rigid Board			
Extruded Polystyrene (Styrofoam)	5.0	4	8
Expanded Polystyrene (Beadboard)	3.6	5½	11
Urethane	6.2	3	6

(b) Top of the Foundation Wall:

An important area for insulation is the place where the upper part of your house meets the foundation wall. This section has several names, such as box sill, band joist and shelf. It is easy to find. Caulk any cracks to prevent air leakage into the house, then insulate by pressing six-inch fiberglass batts into place.

(c) Floors Over Unheated Areas:

Insulate the underside of floors over unheated areas such as crawl spaces, garages or basements. These spaces should be insulated to a minimum of R19. When using insulation with a vapor backing material (brown paper or foil), make sure the vapor barrier is facing up, toward the heated room.

(d) Exposed Foundation Walls:

Insulate the exposed portions of foundation walls, such as those in a basement. Rigid board insulation (styrofoam, beadbord and urethane foam) can be added outside the wall with the portion above ground protected by asbestos cement board or some similar material. (Sunlight causes the insulation to deteriorate.) A more expensive alternative is to build a frame wall on the inside of the foundation, insulating between the studs. Or you can glue rigid board insulation to the foundation wall. For fire safety, make sure it is covered with dry wall.

(e) Uninsulated Frame Walls:

Frame walls containing no insulation are the *last* area of the home to insulate. This is because they are the most difficult and, therefore, the most expensive. It is worthwhile to insulate them if other, more cost-effective measures have been done first, and if you use proven insulation products that are installed properly. Once again, be careful: You must provide a proper vapor barrier.

Normally, *do not* attempt to insulate walls which already contain some insulation. If you have an insulated frame wall with special problems, consult a professional.

WINTERIZATION AND MOISTURE

When you winterize to reduce heat loss from your home, you also will reduce the amount of moisture lost from the home. This will provide greater comfort, but it can lead to problems of excessive moisture. Here are some precautions you should take:

- If you have a power humidifier on your furnace, be sure its control works and is never set above 30% humidity. Adjust the control daily according to outside temperature.
- Limit your use of portable humidifiers.
- If you vent your electric clothes drier inside the house, watch for excessive condensation. (Never vent a gas clothes drier inside the house.)

OTHER WAYS TO SAVE

If you are considering *remodelling* your home, there are several changes you could make to save energy. Among the possibilities: adding a double-door vestibule in the home's entrance; replacing old windows that leak cold air; installing smaller windows, or eliminating windows on the north side of your home (make sure to check with your building inspector and to retain an adequate means of emergency escape in each room); eliminating pipes and ducts in outside walls and insulating the spaces they took up; replacing furnace or water heater with high energy-efficiency models; and insulating outside walls when re-siding. Adding "insulated siding" is not enough. Consider insulating the wall when re-siding.

LET THE WEATHERIZER BEWARE

Like all home improvements, winterization takes planning and care. Among its challenges are the complicated issues of safety and efficiency, the selection of proper materials and the selection of qualified contractors for those jobs a homeowner chooses not to do alone.

Some local utilities and some lenders in Minnesota now are offering home "energy audits" which advise homeowners on how to select and budget for weatherization measures. Check to see whether such assistance is available in your area.

Here are some points to consider when planning your home weatherization program:

- Remember that many home winterization measures are relatively permanent. Take the time to investigate the materials available and to make the right choices. Generally, purchase the highest quality materials you can afford. Similar but less expensive products may have to be replaced sooner and may not be as effective in reducing energy waste.

- Keep in mind that claims of fuel savings for different measures and different materials should be regarded only as "guesstimates." Actual savings will depend on variables such as the quality of your house. In insulation materials, there is often a difference too in the material's "theoretical" and "in place" insulating value. In other words, the material may have a higher insulating value in theory than it does after it has been installed and has gone through settling or shrinkage. Be sure to investigate the material's after-installation insulating value.

- Obtain several cost estimates from well established weatherization firms before choosing a contractor. Ask contractors for the names of several customers for whom they've done work and check to make sure the past customers are satisfied. Make sure all contracts, guarantees and sales promises are *in writing.*

- Be wary of new energy saving products and devices. Some may be quite good but few have been tested by reputable laboratories. The best advice is to be skeptical of new products which have not been approved by reputable underwriters.

- Many homeowners are thinking about supplementing their conventional heating systems with solar systems or woodburning equipment. You should *not* consider a solar system until you have accomplished the weatherization measures outlined in this brochure. ***Solar heating is more expensive than any other at today's prices.*** Your house

should be energy-efficient before trying to install a solar heating system. There are many woodburning stoves now on the market, and they vary a great deal in efficiency. Unless you purchase an efficient stove and burn only properly prepared wood, *you can actually spend more money on wood heat than conventional heat.* Among the features of more efficient woodstoves are airtight construction, designs which provide for secondary combustion and which allow easy loading of sufficient quantities of wood so that you will not have to fuel the fire frequently.

Carefully follow manufacturers instructions and local codes to ensure proper, safe installation and use. *Even at their best, fireplaces are only about 10 per cent efficient.* They are not a good way to heat a house, and actually draw more heat from your home than they add when outdoor temperatures are 40 degrees Fahrenheit or lower. When a fireplace is not in use, make sure the damper is closed tightly to limit the loss of warm air up the chimney.

If you have more specific questions regarding energy conservation in your home, please request Conservation Guides 1-6 from the Minnesota State Energy Agency, Public Information Department, 720 American Center Building, 150 East Kellogg Boulevard, St. Paul, MN 55101 or call 296-5175 (Twin Cities area), 800-652-9028 (Toll Free Statewide). You can also contact your County Extension Office or your local utility and request additional materials. If you are concerned about possible fraudulent or deceptive selling practices, contact one of the Consumer Services Offices listed below:

Consumer Services Section
Minnesota Commerce Department
Metro Square Building
7th and Robert Street
St. Paul, Minnesota 55101
(612) 296-2331

Duluth Branch Office of Consumer Services
Minnesota Commerce Department
604 Alworth Building
306 West Superior Street
Duluth, Minnesota 55802
(218) 723-4891

Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Roland H. Abraham, Director of Agricultural Extension Service, University of Minnesota, St. Paul, Minnesota 55108. The University of Minnesota, including the Agricultural Extension Service, is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, creed, color, sex, national origin, or handicap.

FOR FURTHER INFORMATION

In the Bank or Up the Chimney. U.S. Department of Housing and Urban Development, 1975. Available from U.S. Government Printing Office, Washington, D.C. 20402. Price: $1.70.

Peterson, Roger A. **Understanding Heat Loss and Energy Conservation Codes.** Extension Folder 389, 1978. Available from Bulletin Room, 3 Coffey Hall, 1420 Eckles Ave., University of Minnesota, St. Paul, MN 55108. Single copy free to Minnesota residents.

Anderson, L.O. and Sherwood, G.E. **Condensation Problems in Your House: Prevention and Solution.** U.S.D.A. Forest Service, Agriculture Information Bulletin No. 373, September 1974. Available from U.S. Government Printing Office, Washington, D.C. 20402. Price: $.75. Should be read before planning or installing insulation in a northern climate.

National Association of Home Builders Research Foundation. **Insulating Manual: Homes and Apartments.** N.A.H.B. Research Foundation, P.O. Box 1627, Rockville, MD 20850, September, 1971. Price: $4.00. Excellent "how to" information. Should be read before installing insulation.

Peterson, Roger A. **Minnesota Energy Prices.** Extension Folder 387, 1978. Available from Bulletin Room, 3 Coffey Hall, 1420 Eckles Ave., University of Minnesota, St. Paul, MN 55108. Single copy free to Minnesota residents.

Hand, A.J. **Home Energy How-To.** A Popular Science Book, 1977. Harper & Row Publishers. Price: $9.95. Contains excellent illustrations and practical instructions.

Further readings:

Anderson, Bruce. **The Solar Home Book,** 1976. Available from Chesire Books, Church Hill, Harrisville, NH 03450. Price: $7.50. Has good explanations of heat loss and passive solar heating as well as solar collectors.

Sherwood, Gerald E. **New Life for Old Dwellings.** Solid, easy to understand information on how dwellings are constructed and how they may be remodelled to improve their value. Heat loss control is included. U.S. Department of Agriculture, Forest Products Laboratory. Available from U.S. Government Printing Office, Washington, D.C. 20402. Price: $1.70.

Shelton, Jay. **The Woodburners Encyclopedia,** 1976. Vermont Crossroads Press, Box 333, Waitsfield, VT 05673. Price: $6.95. A very thorough book on wood-burning equipment, safety, and efficiency.

AIA Research Corporation. **Solar Dwelling Design Concepts.** U.S. Department of Housing and Urban Development. Available from U.S. Government Printing Office, Washington, D.C. 20402. Price: $2.30.

Wood for Home Heating. Series of four brochures written at University of Wisconsin—Extension. Available through Minnesota county extension offices or from the Bulletin Room, 3 Coffey Hall, 1420 Eckles Ave., University of Minnesota, St. Paul, MN 55108. Single copies free.

CONSULT THE COUNTY AGRICULTURAL EXTENSION SERVICE OFFICE NEAREST YOU

AITKIN (218) 927-2102, Ext. 21, 22, or 26
Courthouse
Aitkin 56431

ANOKA (612) 755-1280, 1281, 1283, 1422
550 Bunker Lake Blvd.
Anoka 55303

BECKER (218) 847-7195, 6298
Box 663, 818 Washington Avenue
Detroit Lakes 56501

BELTRAMI (218) 751-5564
Courthouse
Bemidji 56601

BENTON (612) 968-7213, 7214
Courthouse
Foley 56329

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342 N.W. Second Street
Ortonville 56278

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821 North Second Street
Mankato 56001

BROWN (507) 794-7993, 7994
108½ West Main Street
Sleepy Eye 56085

CARLTON (218) 384-4281
115 Courthouse
Carlton 55718

CARVER (612) 442-4496
233 South Olive
Waconia 55387

CASS (218) 574-3300, Ext. 212
Courthouse
Walker 56484

CHIPPEWA (612) 269-6521
Courthouse, First Floor
Montevideo 56265

CHISAGO (612) 674-4417, 257-2982
Box 278
North Branch 55056

CLAY (218) 233-2781, Ext. 308, 309
Courthouse
Moorhead 56560

CLEARWATER (218) 694-6151
Courthouse
Bagley 56621

COOK (218) 387-2015
Courthouse
Grand Marais 55604

COTTONWOOD (507) 831-4022
R.R. 2, Box 123
Windom 56101

CROW WING (218) 829-1497
Courthouse
Brainerd 56401

DAKOTA (612) 463-3302
Fairgrounds, 4100-220 Street W.
Farmington 55024

DODGE (507) 374-6435
Main Street
Dodge Center 55927

DOUGLAS (612) 763-6077
Courthouse
Alexandria 56308

FAIRBAULT (507) 526-2138
County Office Bldg., 412 North Nicollet
Blue Earth 56013

FILLMORE (507) 765-3896
Masonic Building
Preston 55965

FREEBORN (507) 373-1475
200 Post Office Building
Albert Lea 56007

GOODHUE (612) 388-8261
Courthouse
Red Wing 55066

GRANT (218) 685-4820
Courthouse
Elbow Lake 56531

HENNEPIN (612) 473-4285
250 North Central, Suite 107
Wayzata 55391

HENNEPIN (612) 823-5241
610 West 28th Street
Minneapolis 55408

HOUSTON (507) 724-3929
310 West Main Street
Caledonia 55921

HUBBARD (218) 732-3391
Courthouse
Park Rapids 56470

ISANTI (612) 689-1810
P.O. Box 193
Cambridge 55008

ITASCA (218) 326-9466
Courthouse
Grand Rapids 55744

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Main Street
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Box 977
Willmar 56201

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LAC QUI PARLE (612) 598-3325
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Courthouse
Ivanhoe 56142

LYON (507) 532-5230
Box 587, Courthouse
Marshall 56258

MAHNOMEN (218) 935-2226
Courthouse
Mahnomen 56557

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Courthouse
Warren 56762

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P.O. Box 804
Fairmont 56031

MCLEOD (612) 864-5551
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Glencoe 55336

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Litchfield 55355

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County Office Building
Milaca 56353

MORRISON (612) 632-3634
Old Courthouse
Little Falls 56345

MOWER (507) 437-6616, 6617
Courthouse
Austin 55912

MURRAY (507) 836-8551
Murray County Courts Building
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P.O. Box 240
St. Peter 56082

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Box 432
Worthington 56187

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Rochester 55901

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Thief River Falls 56701

PINE (612) 384-6156
Cassidy Building
Hinckley 55037

PIPESTONE (507) 825-5416
Box 669
Pipestone 56164

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City Hall
McIntosh 56556

WEST POLK (218) 281-1751
Courthouse
Crookston 56716

POPE (612) 634-5115
Courthouse
Glenwood 56334

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2020 White Bear Avenue
St. Paul 55109

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Red Lake Falls 56750

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Redlake 56671

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Courthouse
Faribault 55021

ROCK (507) 283-2648
110 N. Oakley
Luverne 56156

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208 Courthouse
Roseau 56751

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Courthouse, Rm. 2 (218) 263-6602
Hibbing 55746

NORTHERN ST. LOUIS-VIRGINIA OFFICE
Courthouse (218) 741-5151
Virginia 55792

SOUTH ST. LOUIS (218) 726-7512, 7513
2215 East 5th Street, Room 111
Duluth 55812

SCOTT (612) 492-2370
123 1st Street East
Jordan 55352

SHERBURNE (612) 441-1341
433 Jackson Avenue
Elk River 55330

SIBLEY (612) 237-2344, 2298
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Gaylord 55334

STEARNS (612) 252-2132
2700 1st Street North
St. Cloud 56301

STEELE (507) 451-8040, Ext. 250
County Administrative Annex
Owatonna 55060

STEVENS (612) 589-4884
Agr. Serv. Center, Hwys. 59 & 28 N.
Morris 56267

SWIFT (612) 842-4761
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Benson 56215

TODD (612) 732-6181
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Long Prairie 56347

TRAVERSE (612) 563-4515
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Wheaton 56296

WABASHA (612) 565-4509
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Wabasha 55981

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Wadena 56482

WASECA (507) 835-3610
122 3rd Avenue N.W., Box 70
Waseca 56093

WASHINGTON (612) 439-3220
6081 Oxboro Avenue North
Stillwater 55082

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St. James 56081

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First Level, Courthouse
Winona 55987

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